21 JULY 1980 (FOUO 8/80) 1 OF 1

JPRS L/9202

21 July 1980

West Europe Report

SCIENCE AND TECHNOLOGY

(FOUO 8/80)

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WEST EUROPE REPORT

SCIENCE AND TECHNOLOGY

(FOUO 8/80)

CONTENTS

ENERGY

FEDERAL COAL PROCESSING PROGRAM REVIEWED

Hamburg ERDOEL & KOHLE ERDGAS PETROCHEMIE in German May 80 pp 240-242

/Text/ The processing of coal can become an important cornerstone in the long-term supply of energy and raw materials. Many countries throughout the world have major coal deposits, and the technical possibilities of processing this coal are being tested there. In the Federal Republic of Germany, development work in this sector has been funded by federal means and has reached a high level. The national coal processing program has recently been concluded, and it can be summarized as follows:

1. The Federal Government is herewith presenting the announced program for large-scale coal gasification and coal liquefaction. This program, of course, cannot immediately improve our supply of petroleum and natural gas, but its implementation will increasingly contribute to our energy supply, beginning in the middle of the 80's.

2. Already in 1974, the Federal Government provided the impetus for developing modern technologies for coal processing in the Federal Republic. Up to now, the BMFT (Federal Ministry for Research and Technology) has applied 650 million DM to these technologies.

From 1977 until now, seven pilot installations for coal gasification have been started in the Federal Republic. Another one is under construction. Table 1 provides a survey. The largest of these installations has a throughput of 240 tons of anthracite per day. Several experimental installations for coal liquefaction are in operation, and two pilot installations are under construction (see Table II).

3. In parallel to these domestic efforts, the Federal Government has promoted the development of coal processing by international collaboration. The Federal Republic of Germany, for example, in collaboration with the United States and Japan, is participating in a demonstration project for coal liquefaction in the United States (total costs 1.4 billion dollars).

Table I: Pilot Installations for Coal Gassification, Completed and Under Construction

	0	1	2	3	4	5	6	7	8
A	Betreiber / Daten	Rheinische Braunkohlen-werke AG	Rheinische Braunkohlen-werke AG	Ruhrkohle AG Ruhrchemie AG	Ruhrkohle AG Ruhrgas AG Steag AG	Shell AG	Saarberg-werke AG	VEW AG	PVC (Flick)/ Sophia Jacobs
B	Einsatzenergie:	Braunkohle 1 t/h	Braunkohle 15 t/h	Steinkohle 6 t/h	Steinkohle 7 t/h	Steinkohle 6 t/h	Steinkohle 10 t/h	Steinkohle 1 t/h	Steinkohle 1,5 t/h
C	Produkte:	Synthesegas**	SHG*	Synthesegas 10000 Nm^3/h	Synthesegas, Stadtgas, SHG*	Synthesegas 10000 Nm^3/h	Synthesegas, SHG*	elektr. Energie über Kohlengas	Synthesegas 2500 Nm^3/h
D	Technische Verfahren:	Hochtempe-raturwinkler-Verfahren Wirbelschicht-vergasung	Hydrierende Kohle-vergasung	Texaco-Verfahren Kohlestaub-vergasung	Lurgi-Druck-Vergasung Festbett-vergasung	Shell-Koppers-vergasung Kohlestaub-vergasung	Saarberg/ Otto-vergasung	Partielle Vergasung ohne Druck, mit Luft	Festbett-vergasung
E	Gesamtkosten:	32 Mio DM	150 Mio DM	48 Mio DM	150 Mio DM	100 Mio DM	71 Mio DM	25 Mio DM	25 Mio DM
F	Förderanteil der öffentl. Hand in %	BMFT 65%	BMFT 75%	BMFT 60%	BMFT 75%	Investitionen: keine Betrieb: EG	BMFT 75%	BMFT 65%	NRW 80%
G	Standort:	Frechen	Wesseling	Oberhausen-Holten	Dorsten	Shell-Raffinerie Harburg	Völklingen	Stockum	Hückelhoven
H	Zeitplan:	Planung und Bau: 1974–1978 Versuchs-phase: 1978–1981	Planung und Bau: 1979–1983 Versuchs-phase: 1982–1983	Planung und Bau: bis 1978 Versuchs-phase: ab 1978	Planung und Bau: 1974–1979 Versuchs-phase: 1979–1983	Planung und Bau: 1976–1978 Versuchs-phase: 1979–1980	Planung und Bau: 1975–1978 Versuchs-phase: 1979–1981	Planung und Bau: bis 1976 Versuchs-phase: 1977–1980	Planung und Bau: bis 1979 Versuchs-phase: ab 1979
I	Betriebsbereit:	1978	1982	1978	Sept. 1979	1979	Dez. 1979	1977	März 1979

* SHG = künstliches Erdgas (Substitute Natural Gas)
** Kohlenmonoxid/Wasserstoffgemisch

Key:
A0 Operator/Data
A1 Rhenish Brown Coal Works AG
A2 Rhenish Brown Coal Works AG
A3 Ruhr Coal AG, Ruhr Chemistry AG
A4 Ruhr Coal AG, Ruhr Gas AG, Steag AG
A5 Shell AG
A6 Saarberg Works AG
A7 VEW AG
A8 PVC (Flick)/Sophia Jacobs
B0 Input energy:
B1 Brown coal 1 t/h
B2 Brown coal 15 t/h
B3 Anthracite coal 6 t/h
B4 Anthracite coal 7 t/h
B5 Anthracite coal 6 t/h
B6 Anthracite coal 10 t/h
B7 Anthracite coal 1 t/h
B8 Anthracite coal 1,5 t/h
C0 Products:
C1 Synthesis gas**
C2 SHG*
C3 Synthesis gas 10,000 Nm^3/h
C4 Synthesis gas SHG*
C5 Synthesis gas 10,000 Nm^3/h
C6 Synthesis gas SHG*
C7 Electrical energy via coal gas
C8 Synthesis gas 2500 Nm^3/h
D0 Technical process:

Key (Continued):

D1 High temperature Winkler process, gasification by fluidation
D2 Hydrating coal gasification
D3 Texaco process, coal-dust gasification
D4 Lurgi pressure gasification, fixed-bed gasification
D5 Shell Koppers gasification, coal-dust gasification
D6 Saarberg/Otto gasification
D7 Partial gasification without pressure, but with air
D8 Fixed-bed gasification
E0 Total costs:
E1 32 million DM
E2 150 million DM
E3 48 million DM
E4 150 million DM
E5 100 million DM
E6 71 million DM
E7 25 million DM
E8 25 million DM
F0 Contribution of public means in percent
F1 BMFT 65%
F2 BMFT 75%
F3 BMFT 60%
F4 BMFT 75%
F5 Investments: none operation: EC
F6 BMFT 75%
F7 BMFT 65%
F8 NRW (North Rhine Westphalia) 80%
G0 Location:
G1 Frechen
G2 Wesseling
G3 Oberhausen-Holten
G4 Dorsten
G5 Shell Refinery in Harburg
G6 Völklingen
G7 Stockum
G8 Hückelhoven

H0 Schedule:
H1 Planning and construction: 1974-1978, experimental phase: 1978-1981
H2 Planning and construction: 1979-1983, experimental phase: 1982-1983
H3 Planning and construction: Until 1978. experimental phase: from 1978
H4 Planning and construction: 1974-1979, experimental phase: 1979-1983
H5 Planning and construction: 1976-1978, experimental phase: 1979-1980
H6 Planning and construction: 1975-1978, experimental phase: 1979-1981
H7 Planning and construction: until 1976, experimental phase: 1977-1980
H8 Planning and construction: until 1979, experimental phase: from 1979
I0 Ready to operate:
I4 September 1979
I6 December 1979
I8 March 1979

*SHG = Artificial gas (substitute natural gas)

**Carbon monoxide/hydrogen mixture

Table II: Experimental Installations for Coal Liquefaction

Daten 1 Betreiber	Saarbergwerke AG 2	Ruhrkohle AG Veba-Öl 3	A
Einsatzenergie:	Steinkohle 6 t/Tag	Steinkohle 200 t/Tag	B
Produkte:	Rohbenzin, Mitteldestillate	LPG, Benzin und Mitteldestillate	C
Technische Verfahren:	IG-Verfahren (modifiziert durch Saarbergwerke AG)	IG-Verfahren (modifiziert durch RAG)	D
Gesamtkosten:	ca. 30 Mio DM	ca. 300 Mio DM	E
Förderanteil der öffentlichen Hand in %	75% BMFT und 1,5 Mio DM Saarland	Nur Land NRW: Bauphase: 90% Betriebsphase: 70% Durchschnitt: 80%	F
Standort:	Saarland	Bottrop	G
Zeitplan:	Planung und Bau: 1977–1980	Planung und Bau: 1977–1982	H
Betriebsbereit:	Sommer 1980	1982	I

A1 Operator/Data
A2 Saar Mines AG
A3 Ruhr Coal AG, Veba Oil
B1 Input energy:
B2 Anthracite 6 tons per day
B3 Anthracite 200 tons per day
C1 Products:
C2 Raw gasoline, medium distillates
C3 LPG, gasoline, and medium distillates
D1 Technical method:
D2 IG method (modified by Saar Mines AG)
D3 IG method (modified by RAG)
E1 Total costs:
E2 about 30 million DM
E3 about 300 million DM
F1 Contribution of public funds in percent
F2 75% BMFT and 1.5 million DM Saarland
F3 Only the Province of North Rhine Westphalia:
construction phase: 90%
operating phase: 70%
average: 80%
G1 Location:
G2 Saarland
G3 Bottrop
H1 Schedule:
H2 Planning and construction: 1977-1980
H3 Planning and construction 1977-1982
I1 Ready to operate:
I2 Summer 1980
I3 1982

4. Through its efforts to date, the Federal Government has created the preconditions for attacking coal gasification and coal liquefaction at the present time on a large scale.

5. Because of this starting position, and because of the central significance of a secure energy supply, the Federal Government declared, on 4 July 1979, that it must now undertake a major effort, jointly with industry, to promote the large-scale generation of gas, oil, and gasoline from coal, at high power and without delay.

6. On the basis of this declaration, and after discussions with industry, the business enterprises proposed 14 projects for large-scale coal processing.

According to present estimates, implementation of all these projects will require investments of about 13 billion DM by 1993 (1979 price base). Even with this expenditure, only a small percentage of the petroleum and natural gas imports can be replaced at first. However, the precondition for broad future industrial utilization of coal processing will be created thereby.

7. Large-scale coal-processing installations will create environmental pollution, which will lead to new areas of conflict with environmental protection. Active environmental protection is therefore necessary. Special efforts must be made in this connection, in order to reduce pollution at the coal-processing sites, especially in the anthracite districts. This can be achieved by expanding the remote heating and natural gas networks, but also by replacing outmoded anthracite power plants by modern power plants. This will provide a positive stimulus for additional investment.

The environmental compatibility is an essential and central point in the further planning of individual projects.

8. Apart from its contribution towards reducing our dependence on energy imports, coal processing can increase production and employment in industry and can create a new field for continuous investment activity.

In view of increasing efforts towards petroleum substitutes, interest in coal processing may rise worldwide. The construction of modern reference systems will increase the competitive capability of our industry, will improve its export chances, and will thus also increase employment and production.

Such exports, combined with German investments in foreign coal mining and processing systems, can expand and secure the energy and raw material supply of the German economy.

9. If all the project proposals are implemented as planned, the demand for anthracite coal for processing will rise to about 12 million tons per year by 1993, and the demand for brown coal will rise to about 10 million tons per year. According to the plans of the entrepreneurs, these quantities are available, but will require considerable investment in German coal mining. Especially for brown coal, it is a fact that a further expansion of coal processing can be expected only if nuclear power plants displace more coal from the electricity generating sector. Furthermore, as regards anthracite, a further expansion of coal processing must lean significantly on imported coal.

10. At the present time, coal processing is not yet economical in the Federal Republic. The economic threshold that lies closest is the production of synthesis gas from brown coal. Liquid products and artificial gas from German anthracite coal are today about two to four times as expensive as petroleum products or as natural gas. When using imported coal, liquid products still cost about twice as much. The cost relationships should shift in favor of coal, by the time that the first major installation is started up in the middle of the 80's.

11. In comparison to coal processing, the displacement of heavy heating oil in industry and power plants by coal, and the conversion of the displaced heavy heating oil into gasoline and light heating oil, is the quicker and more economical route. This potential for about 20 million tons per year must therefore also be utilized with all emphasis.

12. It is a matter of course for the Federal Government that industry will implement the projects of the coal-processing program under its own authority and responsibility, and will accept a significant portion of the risks and costs. The Government will here support industry to the extent required.

13. To implement the coal-processing program, the Federal Government has decided first of all to fund preliminary projects, to the extent that this is necessary for attacking the projects at the proper time. During the years 1980 and 1981, about 70 million DM will be required for this, and these means are available. The Land of North Rhine-Westphalia is financing three preliminary projects. Several businesses have begun preliminary projects without public assistance in the expectation of subsequent major funding.

14. The preliminary projects are the first step towards implementing larger scale coal-rocessing installations. By means of these projects, the businesses are implementing basic planning work concerning technical design, location, environmental protection, time schedules, costs, and economy of individual projects.

15. By means of the preliminary projects, the costs and risks of these installations can be determined with adequate reliability. The preliminary projects will furnish business with a basis for construction decisions, and will furnish the Federal Government with a basis for its decisions concerning further public assistance.

The essential results of the preliminary projects will presumably be available by the end of 1980, as regards coal gassification, and by the middle of 1981, as regards coal liquefaction.

8348
CSO: 3102

ENERGY

COAL GASIFICATION, LIQUEFACTION PROJECTS REVIEWED

Paris REVUE DE L'ENERGIE in French Apr 80 p 225

[Article: "Gasification, Liquefaction of Coal" "Federal Republic of Germany"]

[Text]--Rhine Lignite Company (Rheinbraun) is building a pilot-plant at Wesseling, on the Rhine, to gasify brown coal through hydrogenation. This is a plant designed to transform 11 metric tons per hour, supported by the Federal government to the tune of 111 millions DM. Methane will be produced at a pressure of 120 bars, which can provide city gas systems with a substitute for natural gas.

Everything that will ultimately be required in a full scale system is already included in the pilot plant being built at Wesseling. An initial installation, which has been discussed, would be a model plant which could come on stream in the early 90's and which would treat 5 million metric tons per year to brown coal.

--Veba Oil Company, a subsidiary of Group Veba, has decided to build an installation costing 4 billion DM, which could both liquefy coal by hydrogenation and up-grade heavy oil into lighter fractions. This project, which uses the "improved Bergius hydrogenation process" to fully convert heavy oil, has been under study at the Federal Research Ministry, which has decided to support it.

--The Germany group Flick has decided to expand its involvement with coal gasification, a fairly new activity for this group. From now until 1982, detailed planning will be done for a large-scale installation with a capacity of 500,000 metric tons of coal per year in Hueckelhoven, near the Dutch-German border, to be most likely followed by its actual construction.

--Krupp-Koppers Company, Ltd., will build at the "Janina" complex, in the Katowice coal-basin, a coal gasification installation using the "Koppers-Totzek" process. Purchase orders have been officially transmitted to the Polish state enterprise Kopex. First deliveries of equipment will start in 1982, and gas production is scheduled for 1984. An investment of 250 million DM will be required.

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CSO: 3102

ENERGY

LARGEST SOLAR COLLECTOR TO BE DISPLAYED

Paris REVUE DE L'ENERGIE in French Mar 80 p 176

["Materials and Techniques" announcement]

[Text] The Marseille Exhibit of Solar Energy and New Sources of Energy, to be held from 10 June to 14 June 1980, will feature the largest currently marketable solar collector.

This will be the first time that this collector is exhibited. It was built by a Marseille enterprise, SICOPA (International Paraboloid Construction Company).

This collector, with a diameter of 10 meters and an area of 75 m^2, is shaped like an enormous mirrored corolla. It is composed of a tubular foot anchored in the ground; a movable head at the top of the tube, supporting the paraboloid mounting; a paraboloid whose front surface is covered with facetted mirrors; a heating element, including a primary circuit, adapted to the desired temperature; an automatic suntracking device; a hydraulic pump which provides rotation and aim; and finally, an automatic restarting device if wind velocities exceed tolerated speeds.

The average hourly thermal production under clear sunny conditions is 45 KWS/H over a one-year period.

11,023
CSO: 3102

TRANSPORTATION

AIRBUS INDUSTRIE: PRESENT STATUS, FUTURE PLANS

Paris AIR & COSMOS in French 26 Apr 80 pp 35-37, 39

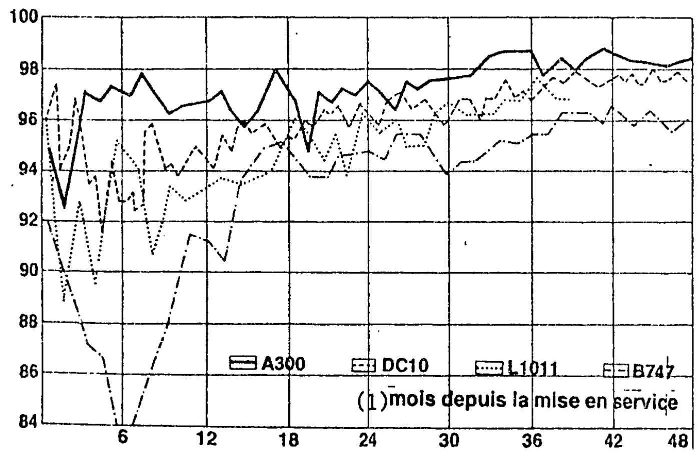
[Article by Jacques Morisset; passages enclosed within slantlines printed in boldface]

[Text] The Hanover Salon is an excellent occasion to survey the past, present, and future activity of Airbus Industrie.

Eleven years have passed since the decision, in May 1969, by the German and French governments to launch the Airbus operation; the Netherlands, and then Spain next joined the consortium during the development phase of the A 300; in July 1978 Airbus Industrie launched a second airplane, the A 310, while Great Britain, up to then represented by private firms, Hawker Siddeley, then British Aerospace, decided to become, quite separately, a member of the consortium (November 1978); last, in February 1979 Belgium, through Belairbus as intermediary, in its turn, joined the five participating countries as an associated subcontractor.

The results already achieved with the A 300 alone, of which five versions are in service (A 300, B 2-100 and 200/300, A 300 B 4-100 and 200, and A 300 C4) speak for themselves; on 18 April 97 aircraft were in service (37 of model B 2,60 of Model B 4) in 17 airlines, the principal ones obviously the companies which started the project: Air France (17 airplanes) and Lufthansa (10 airplanes), and Eastern Airlines, the first American company to use the Airbus (14 airplanes in service). The results achieved are gratifying, as much in the area of economy of operation as in that of reliability, which shows up in a reliability ratio of between 98 and 99 percent, better (after the same number of months of operation) than that of the other jumbo jets: B 747, DC 10, and L 1011 as is shown by the chart opposite (shown below in the translation]. Moreover, the A 300, thanks to its capability of Category III approach and landing, combined with the feasibility of returning to full throttle at a height of 15 feet, even with a breakdown in one motor, can be operated under all conditions of poor visibility.

At mid-April these 97 Airbus airplanes had effected an aggregate of 400,000 hours of flight and 306,000 landings.



The technical reliability of the Airbus A 300 is all the more remarkable as it is often used for short hops, the most severe for the equipment (average flight duration less than 2 hours).

Key: 1. Months since entering into service

216 Airplanes Sold in 12 Months

Satisfaction of the first customers, combined with aggressive sales personnel, has enabled Airbus to break into, definitely, a world market long considered--to the extent of 90 percent--the private preserve of the three large American manufacturers. To convince airlines spread over the five continents to change suppliers was certainly not easy; for that it took several years but the results speak for themselves; the share of Airbus Industrie in all jumbo jet aircraft of every category (that is, from short haul to long haul) has grown from 3 percent in 1976 to 19 percent in 1977, 23 percent in 1978, and 31 percent in 1979. And if the long haul carriers are excluded the results are even more satisfaction: Airbus Industrie holds 58 percent of the world market, ahead of Boeing (21 percent), Lockheed (15 percent), and Douglas [as published--McDonnell-Douglas] (6 percent).

THE YEAR 1979 WAS IN FACT EXTRAORDINARY. From 180 airplanes sold (121 firm orders plus 59 on option) the A 300/A 310 total has increased to 396 (253 + 143), which represents 216 airplanes sold in 12 months. At the beginning of this month the order backlog amounted to 404 airplanes (257 + 147), equivalent to 1,200 Caravelle airplanes; to this should be added letters of intent for 12 aircraft. Such is the measure of the progress achieved, which puts Airbus Industrie in second place worldwide. And this is not the end since the requirements of the 34 airlines which are now customers of Airbus Industrie represent, between now and 1993, a potential market for 920 aircraft. Considering the world requirements (2,600 medium transports of more than 200 seats between now and 1993) Airbus Industrie in fact hopes to sell, in that period, about 1,100 airplanes, thanks to new customers.

More Than 100 Airplanes Annually in 1985

With the A 300, as with the A 310 (which is to fly in the spring of 1982 and will enter service in March 1983) a production problem now confronts Airbus Industrie and its collaborators. The very steady increase in rate of the present production line is being effected in accordance with a rigorous procedure which is aimed at LOWERING FABRICATION AND ASSEMBLY TIME WHILE MAINTAINING CONSISTENT QUALITY. Last year 25 airplanes were constructed, making a cumulative total (1974-1979) of 94; this year 33 will be produced, then 43 in 1981 (rate of 4[per month]); a rate of 5.3 will be achieved in 1982, 6.5 in 1983, and 8 in 1984; in 1985 it is contemplated to reach a rate of 10, corresponding to more than 100 airplanes annually.

Since a production effort is possible only because of the enormous potential of the manufacturers of the six associated countries: 163,200 employees plus 13,040 in laboratories (ONERA, DFVLR, NLR, RAe). Of this number about 14 percent are actually working in the Airbus program, that is, 18,000 to 19,000 persons, a number which should increase to 40,000 when the production rate is 10.

In passing let us note that, contrary to accepted notions, construction of the Airbus in seven plants located in five countries represents a GEOGRAPHICAL DISPERSION MUCH SMALLER THAN IS THE CASE WITH AMERICAN AIRCRAFT: Douglas subcontracts in Canada and Italy, Boeing in Japan and Italy also. In fact, because of utilization of two Super Guppy Cargo airplanes no major part of the Airbus is more than 48 hours away from an assembly line. At the higher production rates projected the situation will be unchanged, with maintenance of a single A 300/A 310 production line in Toulouse and use of four Super Guppy aircraft. Quite the contrary--the support of six governments and the great capabilities of the manufacturers associated in the operation constitute a guarantee of continuity, of which customers are now aware, for, considering the useful life of an airplane (25 to 30 years, and perhaps more) and the staggering of orders, an airline which selects a particular model of airplane is also choosing a manufacturer--for 40 years....

Future Aircraft

At this Hanover Salon Airbus Industrie at last made public the principal characteristics and the performance of Aircraft being studied, along with its partners, to extend the present A 300/A 310 range upward and downward.

The A 300 and A 310 have many things in common: the fuselage diameter, certainly, whose 5.46 meters makes it possible to accommodate, with comfort, rows of eight seats (arranged 2 + 4 + 2) or nine seats (3 + 3 + 3) in the so-called "charter" arrangement, which indeed enables the A 300 to carry up to 345 passengers; in 1983 an important bridge will be crossed (see AIR & MOSMOS, No 803) with the appearance of the A 300-600, an airplane benefiting from the improvements and modifications resulting from the continuous progress achieved by the Airbus constructors, and also the progress achieved in systems, motors, and structure, all of which will materialize in the A 310. Then it will be as though, wings apart, the A 300-600 were an elongated A 310...and of still higher performance than the present A 300 since it will incorporate:

an 8 percent improvement in "specific rante";

a 10 to 12 percent decrease in the cost of a passenger-kilometer; and

a seating capacity increased by 12 with equal comfort (in the single class model the number of seats will increase from 278 to 290) while the airplane will be able to carry, because of increased weight when empty and without fuel (+ tons) and increased maximum landing weight (137 tons instead of 134), an additional 1 ton of freight.

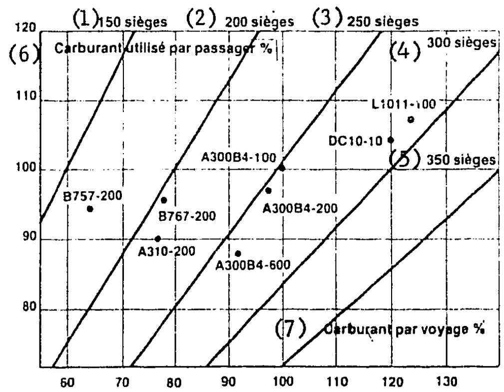
But these improvements, as interesting as they may be, are not stopping some airlines from asking for, on the one hand, still more increased capacity (comparable to that of the DC-10-10 or Tri Star) and, on the other hand, an airplane of smaller size, but of design and utilization homologous with those of the present aircraft. Hence the more and more pressing study of the TA 9 (elongated version) of the SA 1 and SA 2 (airplanes of 120/160 seats) and, over the longer term, of the TA 11 with very long flying range.

The table below and performance curves on the following page [shown following table] make possible, for the first time, a look at all the present and future airplanes. The TA 9, which will provide seating capacity increased by 25 percent is, it seems, the project most likely to pass from preliminary to construction phase. Its actual capacity in "charter" arrangement will approach 400 seats. In mixed class arrangement, for example, it will provide 313 seats--30 in first class, and 283 in tourist; as for cargo capacity, it will be increased by 50 percent. Of course, as with the present A 300, two versions will be offered, characterized by different maximum weights (162 and 182 tons), corresponding to like difference in fuel capacity.

Characteristics and Performance of the Present and Future Aircraft in the Airbus Industrie Range

	A 300			A 310		TA 9		TA 11	SA	
Aircraft model	B2 200	B4 100	B4 200	200	300	100	200	2 versions	1	2
Motors (thrust in tons)	2x23	2x24	2x24	2x22	2x23	2x24	2x26	4x12/14	2x9	2x11.5
Length (meters)	53.55	53.55	53.55	46.66	46.66	62.03				
Span (meters)	44.84	44.84	44.84	43.90	43.90					
Height (meters)	16.53	16.53	16.53	15.80						
Wing surface (sq.meters)	260	260	260							
Seats (mixed (classes)	251	251								
Freight (LD3)	20	20								
Fuel (tons)	34	49								
Weights* OWE	86.6	88.5								
(tons) MTOW	142	157.5								
MZFW	120.5	126								
MLW	130	136								
Cargo (tons)	33.9	37.5								
Flying range with full passenger load (kilometers)	3,350	4,950								

*OWE: operational weight empty
MTOW: maximum design take-off weight
MZFW: maximum design zero fuel weight
MLW: maximum design landing weight



Comparison of consumption on a flight of 1,850 kilometers (Airbus Industries publication)

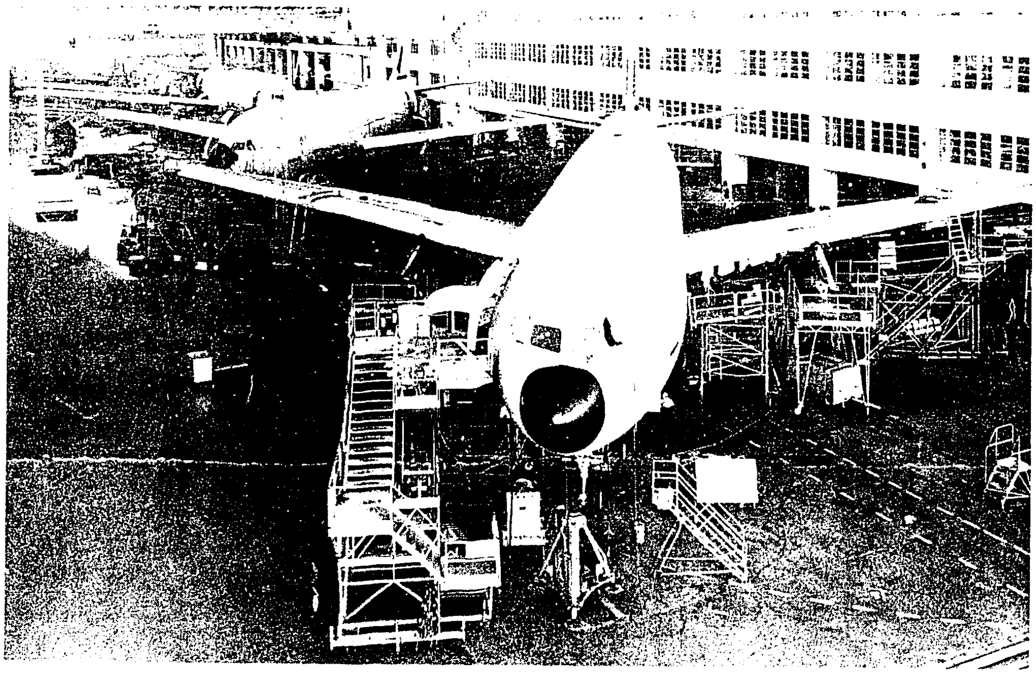
Key:

1. 150 seats
2. 200 seats
3. 250 seats
4. 300 seats
5. 350 seats
6. Fuel consumption [comparative?] per passenger, percent
7. Fuel consumption [comparative?] per trip, percent

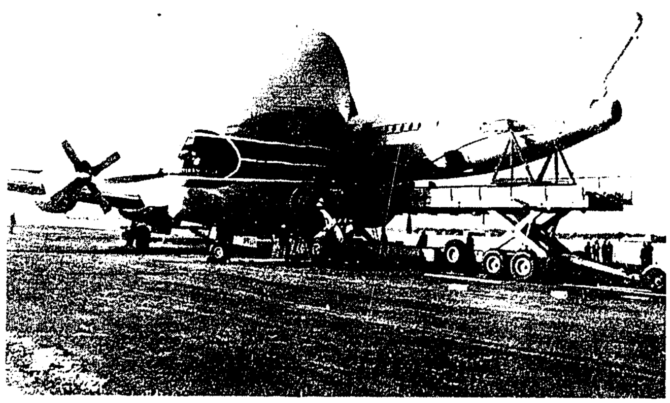
There is an interesting point in the flying ranges, which remain comparable to those of the A 300 B2 and B4. The motors planned are of course the most powerful in the new ranges of General Electric (CF 6-80C1) and Pratt and Whitney (JT9D-TR4H) and will indeed provide thrusts of between 24 and 26 tons.

Let us pass over the TA 11 and going further we come to the SA 1 and SA 2, much smaller airplanes whose cabins will therefore have but a single aisle, and which are Airbus Industrie's response to the future Boeing B 737-300. The SA 1 version (132 seats, or 122, that is 110 plus 12 in mixed class arrangement) will have CFM 56-3 or RJ-500 (Rolls-Royce/Japan) engines of 9 tons thrust each; the SA 2 version, longer, will provide 162 seats, or 132 plus 16 in mixed class arrangement, and will require more powerful motors (CFM 56-4 of 1.3 tons each of JT10D-266 of 11.8 tons each) while keeping the same wing surface of 122 square meters.

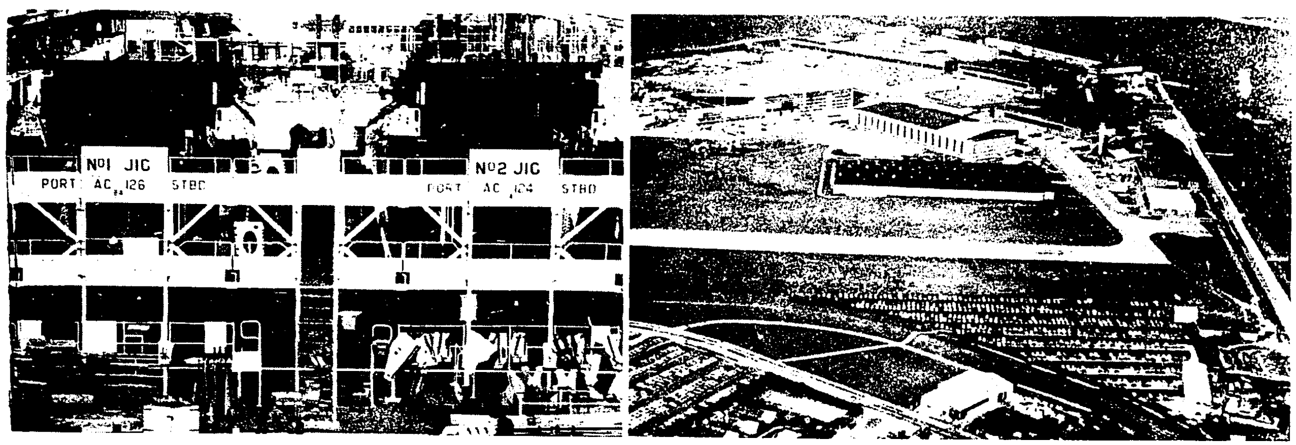
We will certainly have the occasion to write again about these various projects which are more and more advanced; by all evidence Airbus Industrie has only begun the great battle which will pit it against Boeing in the next few years.



Recently taken at Toulouse, this photograph of the A 300 assembly line shows airplanes No 110 (in front), 111, and 112



The Supper Guppy is also used for partners of Airbus Industrie: transporting a "one-eleven" to Romania



At left, assembly and manufacturing hangar in preparation by VFW at Einswarden; at right, the new bay under construction at Toulouse; at first it will contain the first two A 310 airplanes and then will be used to lengthen the single A 300/A 310 production line.

A recently delivered A 300 B 4-200; that of Pakistan International Airlines

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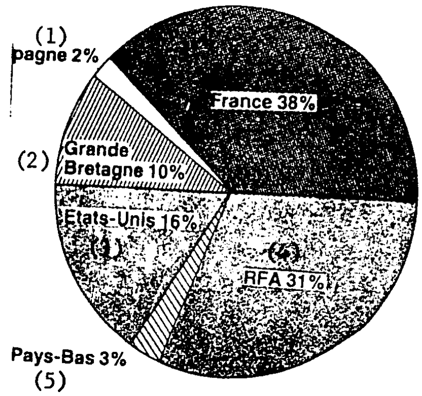
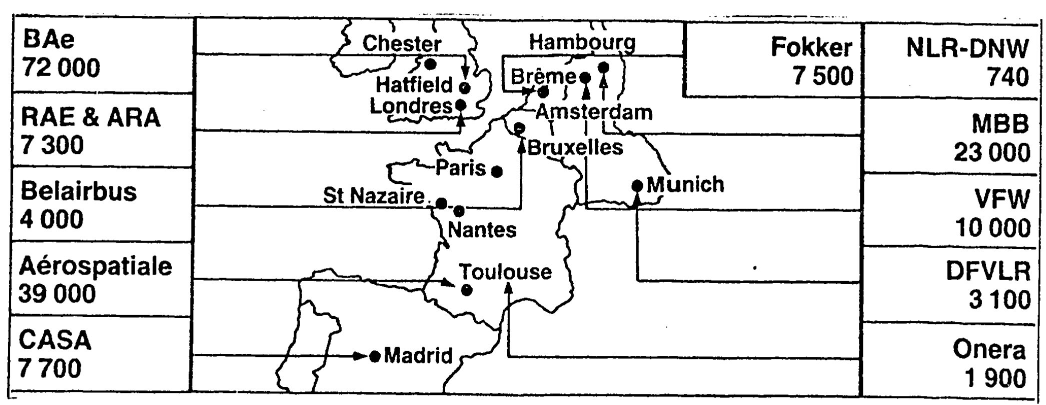


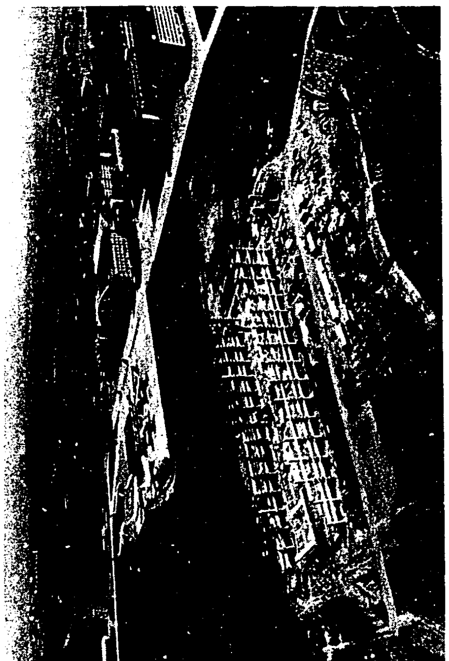
Distribution of A 300 work among the five European collaborators and American industry (General Electric, equipment supplier); the A 310 distribution will be little different; below, distribution of manpower available in Europe

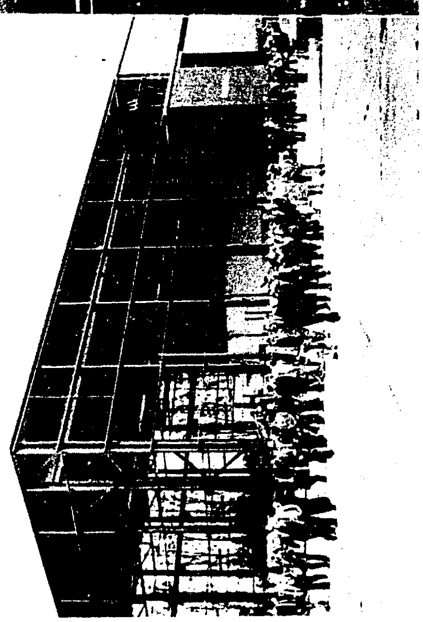
Key:

1. Spain
2. Great Britain
3. United States
4. Federal Republic of Germany
5. Netherlands



1979 total: Industry, 163,200 Research (civil only), 13,040





At left, in the background, three new assembly structures erected at Chester (British Aerospace) to provide for assembling A 310 wing spar boxes; in the foreground, the Nos 1 and 2 structures occupied by the wings of Airplanes Nos 126 and 124; at right, MBB is also increasing the capacity of its Hamburg shops; the additional hangars at upper left in the photograph will also be used for interior finishing of aircraft.

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TRANSPORTATION

AIRBUS: PROGRESS ON FORWARD FACING CREW COCKPIT

Paris AIR & COSMOS in French 31 May 80 p 25

[Article by G.C.]

[Text] The concept of the FFCC [Forward-Facing Crew Cockpit] being proposed by Airbus Industrie has been amply commented in these columns (see especially AIR & COSMOS Nos 791 and 792).

By way of supplement, we publish herewith the following information recently disseminated by Airbus Industrie:

--the FFCC developmental timetable

--the geometry of the third crew-member position.

Airbus Industrie is pursuing its design studies on this cockpit; the illuminated mock-up, with fronts, will be ready very shortly for a presentation to Swissair. Concurrently, Airbus Industrie is continuing its evaluation studies on the crew workload from the strictly physiomechanical standpoint (movements of the arms, eyes, etc.), but also on the crew mental stress. These evaluations are being made by teams consisting of pilots, technicians, physicians and psychologists; this gives some idea of the thoroughness with which Airbus Industrie is carrying out its work.

As may be noted from the timetable, the first FFCC-equipped A 300 Airbus will be flight-tested in mid-1981. Airbus Industrie will at that time be prepared to fly pilots from interested airlines on an FFCC-equipped A 300 and on a conventional A 300, offering them for the first time in aeronautical history the opportunity to fly planes of exactly the same type but equipped with cockpits of different design, and thus to evaluate them on a comparative basis.

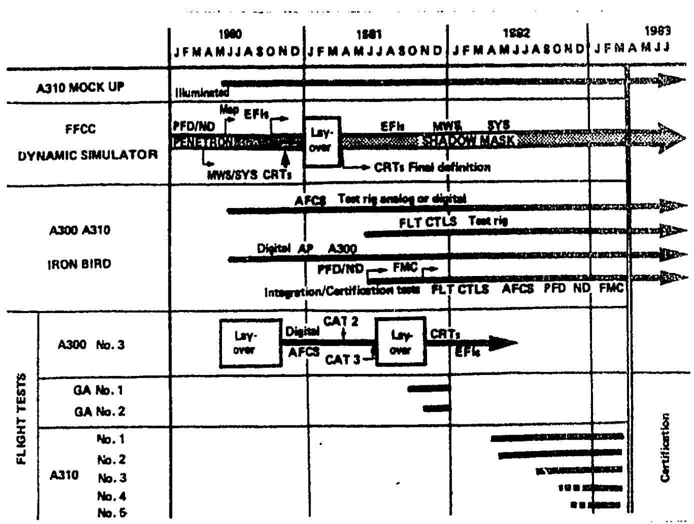
It thus appears from Airbus Industrie's developmental timetable that by the time of the first A 310 flight, scheduled for early 1982, a considerable body of experience with the FFCC will have been accumulated, thanks to:

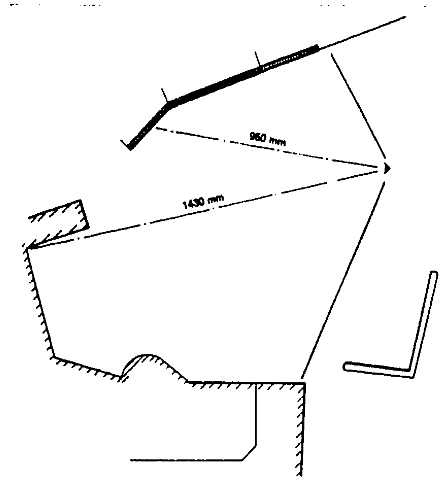
--the development of systems through mock-ups and simulators: cathode-ray tubes, management warning systems, automatic flight control systems, and the flight and navigational management calculator of the FMS [Flight Management System].

--the Garuda planes by autumn of 1980 [as published];

--the flight-test A 300 No. 3 plane.

FFCC Developmental Timetable for the A 300 and A 310





Geometry of third crew-member position
in FFCC on A 310/A 300

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END

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